DIVIDING 24

NUMBER

- Division
- Patterns
- Counting

Getting Ready

What You'll Need

Snap Cubes, 24 per pair
Small paper plates, 24 per pair
Overhead Snap Cubes (optional)

Overview

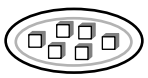
Children explore different ways that 24 Snap Cubes may be divided into equal-sized sets. In this activity, children have the opportunity to:

- view division as making same-sized sets
- recognize that a set may be divided in more than one way

The Activity

Introducing

- Display six Snap Cubes on a paper plate. Draw this on the chalkboard. Tell children to imagine that the cubes are small cakes. Say that this plate holds *one serving of six cakes.*



- Ask how the six cakes could be arranged on plates to make more than one serving. Explain that each serving must have the same number of cakes as the other servings.
- Have children use Snap Cubes and paper plates to show their solutions and explain why the servings are equal in size. Record pictures of their solutions on the board next to your drawing.

"Two servings of three cakes"

"Three servings of two cakes"

"Six servings of one cake"

- Establish that the six cakes cannot be arranged on plates to make 4 or 5 equal servings.

On Their Own

If you have 24 cakes, in how many different ways can you make equal servings?

- Work with a partner. Get 24 Snap Cubes to use as cakes. Get paper plates to hold the servings.
- Place all the Snap Cubes on plates so that the plates hold equal servings. Each plate must hold the same number of cakes. No cakes may be left over.
- Record what you did by drawing a picture of the plates of cakes.
- Now use a different number of plates to make equal servings from the 24 cakes. Record what you did.
- Continue to find and record ways to make equal servings until you think you have found them all.
- Look for patterns in your numbers of equal servings.

The Bigger Picture

Thinking and Sharing

When children think that they have found all the numbers of equal servings, call them together to share their findings. Ask volunteers to record a picture of one their solutions on the board. Continue until all the possibilities have been listed.

Use prompts such as these to promote class discussion:

- What is the greatest number of equal servings you could make? the least number?
- How do you know that you have found all of the possibilities?
- Do you see any patterns in the solutions?
- If you make two (three, four, and so forth) servings, what fractional part of the 24 cakes does each person get?

Drawing

Have children draw cakes on plates to show how they could arrange 12 cakes so that they and three friends would each have equal servings.

Extending the Activity

1. Have children identify how many cakes would be left over if 7, 9, 10, or 11 servings were made from 24 cakes.
2. Show three plates with six cubes on each plate. Ask children to look for other ways to arrange these cubes equally.

Teacher Talk

Where's the Mathematics?

The idea of sharing food with friends is a familiar one that children can relate to easily. This activity gives children an opportunity to connect the idea of sharing something fairly and equally with the concept of division.

Summarizing the data that children have collected helps children learn that one of mathematics' most powerful tools is organizing data so that patterns emerge. The summary could look like this:

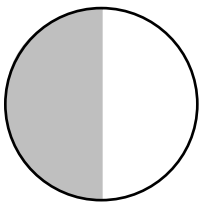
Number of Servings	Serving Size
1	24 cakes
2	12 cakes
3	8 cakes
4	6 cakes
6	4 cakes
8	3 cakes
12	2 cakes
24	1 cake

Children will probably point out that, as the number of servings increases, the serving size decreases. Also, the columns showing the number of servings and serving sizes include the same numbers in reverse order. You may wish to introduce the word *factor* as the word used to describe the numbers that divide equally into another number. So, the factors of 24 are 1, 2, 3, 4, 6, 8, 12, and 24.

Organizing the data into a list such as the one above can help children see whether or not they have exhausted all the possibilities. For example, children may have found seven of the possible solutions, yet overlook one of them, such as 12 servings of 2. Seeing how the numbers in the list are reversals of each other could lead them to question whether 12 servings of 2 would be possible and then test it with their Snap Cubes. Children may also suggest that if five servings were a possibility, then the serving size would have to be 5 cakes in order for the numbers to fit into the list. Using Snap

Cubes or counting by 5s, they can eliminate this possibility when they wind up one cube short for the last plate. Using this same type of reasoning, if 7 servings were possible, the serving size would have to be between 3 and 4 and since the cubes cannot be cut, this is not possible.

You may like to informally introduce the concept of fractional parts of a whole set into the discussion. You might explain, for example, that if two servings are made, each person gets ½ of the 24, or 12 cakes. If three servings are made, each person gets ⅓ of the cakes, and so forth. Frequently, in the primary grades, the only model used to describe fractional parts is the area model like the one shown below.



Half of the circle is shaded.

Modeling equal servings of cakes as done here introduces the concept of fractional parts of a set. Later, when children work with multiplying fractions, they will use this concept frequently in solving problems, such as ¼ x 24 = 6.

You may want to explore the idea of remainders as you ask children to think about what 5 equal servings would look like if they could cut the cakes and distribute the halves. Answers such as, “Each serving would have more than 4 cakes but less than 5 cakes,“ or “Each serving would be almost 5 cakes” would be very good answers and introduce the idea of number on a continuum rather than as discrete whole-number points on a number line.